Listing of Claims

Claim 1 (Original): A method of determining the status of a bi-directional virtual circuit in a first end system, wherein said bi-directional virtual circuit is provisioned between said first end system and another end system, said method comprising:

receiving in said first end system a plurality of loopback command packets from said another end system on said bi-directional virtual circuit;

sending from said first end system a plurality of loopback response packets to said another end system, wherein said another end system determines that said bi-directional virtual circuit is operational based on the reception of said plurality of said response packets; and

concluding in said first end system that said bi-directional virtual circuit is operational according to the determination of said another end system.

Claim 2 (Original): The method of claim 1, wherein said concluding comprises:

examining a receive frequency at which said plurality of loopback command packets are received; and

determining that said bi-directional virtual circuit is operational if said receive frequency does not change substantially.

Claim 3 (Original): The method of claim 2, wherein said bi-directional virtual circuit comprises a permanent bi-directional virtual circuit provisioned on an asynchronous transfer mode (ATM) backbone, and each of said plurality of loopback command packets and plurality of loopback response packets comprises a cell.

Claim 4 (Original): The method of claim 3, wherein said plurality of loopback command packets and said plurality of loopback response packets are generated consistent with ITU-T Recommendation I.610.

Claim 5 (Original): The method of claim 2, wherein said first end system continues to conclude that said bi-directional virtual circuit is operational if said receive frequency does not change substantially and does not send new loopback command packets to said another end system.

Claim 6 (Original): The method of claim 5, further comprising:

sending another plurality of loopback command packets at a sending frequency; and

comparing said sending frequency with said receive frequency, wherein said first end system determines not to send new loopback command packets based on said comparing.

Claim 7 (Original): The method of claim 6, wherein said first end system determines not to send new loopback command packets if said sending frequency is less than said receiving frequency.

Claim 8 (Original): The method of claim 6, wherein said first end system waits a random amount of time before stopping sending new loopback command packet if said sending frequency is at least approximately equal to said receive frequency.

Claim 9 (Original): The method of claim 1, wherein each of said first end system and said another end system comprises an edge router.

Claim 10 (Original): A first end system determining the status of a bi-directional virtual circuit, wherein said bi-directional virtual circuit is provisioned between said first end system and another end system on a network backbone, said first end system comprising:

an interface coupled to said network backbone, said interface receiving a plurality of loopback command packets from said another end system on said bi-directional virtual circuit;

a memory storing information indicating whether said bi-directional virtual circuit is operational; and

a processor sending a plurality of loopback response packets to said another end system in response to receiving said plurality of loopback command packets, wherein said another end system determines that said bi-directional virtual circuit is operational based on the reception of said plurality of said response packets, said processor storing data in said memory indicating that said bi-directional virtual circuit is operational if said another end system determines that said bi-directional virtual circuit is operational.

Claim 11 (Original): The first end system of claim 10, wherein said processor examines a receive frequency at which said plurality of loopback command packets are received and determines that said bi-directional virtual circuit is operational if said receive frequency does not change substantially.

Claim 12 (Original): The first end system of claim 11, wherein said bi-directional virtual circuit comprises a permanent bi-directional virtual circuit provisioned on an asynchronous transfer mode (ATM) backbone, and each of said plurality of loopback command packets and plurality of loopback response packets comprises a cell.

Claim 13 (Original): The first end system of claim 12, wherein said plurality of loopback command packets and said plurality of loopback response packets are generated consistent with ITU-T Recommendation I.610..

Claim 14 (Original): The first end system of claim 11, wherein said first end system continues to conclude that said bi-directional virtual circuit is operational if said receive frequency does not change substantially and does not send new loopback command packets to said another end system.

Claim 15 (Original): The first end system of claim 14, further comprising:

sending another plurality of loopback command packets at a sending frequency; and

comparing said sending frequency with said receive frequency, wherein said first end system determines not to send new loopback command packets based on said comparing.

Claim 16 (Original): The first end system of claim 15, wherein said memory continues to indicate that said bi-directional virtual circuit is operational if said sending frequency is less than said receiving frequency.

Claim 17 (Original): The first end system of claim 15, wherein said first end system waits a random amount of time before stopping sending new loopback command packet if said sending frequency is at least approximately equal to said receive frequency.

Claim 18 (Original): The first end system of claim 10, wherein each of said first end system and said another end system comprises an edge router.

Claim 19 (Original): The first end system of claim 10, wherein said memory stores a virtual circuit (VC) table, wherein said VC table stores data indicating whether said bi-directional virtual circuit is operational.

Claim 20 (Original): The first end system of claim 10, wherein data packets are transmitted on said bi-directional virtual circuit only if said memory indicates that said bi-directional virtual circuit is operational.

Claim 21 (Original): A first end system determining the status of a bi-directional virtual circuit, wherein said bi-directional virtual circuit is provisioned between said first end system and another end system on a network backbone, said first end system comprising:

means for receiving a plurality of loopback command packets from said another end system on said bi-directional virtual circuit;

means for sending a plurality of loopback response packets to said another end system, wherein said another end system determines that said bi-directional virtual circuit is operational based on the reception of said plurality of said response packets;

means for storing data indicating whether said bi-directional virtual circuit is operational or not; and

means for concluding that said bi-directional virtual circuit is operational according to the determination of said another end system, wherein said means for concluding causes said means for storing to store data to indicate that said bi-directional virtual circuit is operational.

Claim 22 (Original): The first end system of claim 21, wherein said means for concluding determines a receive frequency at which said plurality of loopback command packets are received and determines that said bi-directional virtual circuit is operational if said receive frequency does not change substantially.

Claim 23 (Original): The first end system of claim 22, wherein said bi-directional virtual circuit comprises a permanent virtual circuit provisioned on an asynchronous transfer mode (ATM) backbone, and each of said plurality of loopback command packets and plurality of loopback response packets comprises a cell.

Claim 24 (Original): The first end system of claim 23, wherein said plurality of loopback command packets and said plurality of loopback response packets are generated consistent with ITU-T Recommendation I.610.

Claim 25 (Currently Amended): A computer readable medium carrying one or more sequences of instructions for causing a first end system to determine the status of a bi-directional virtual circuit, wherein said bi-directional virtual circuit is provisioned between

said first end system and another end system, wherein execution of said one or more sequences of instructions by one or more processors contained in said ~~gateway device~~ first end system causes said one or more processors to perform the actions of:

receiving a plurality of loopback command packets from said another end system on said bi-directional virtual circuit;

sending a plurality of loopback response packets to said another end system, wherein said another end system determines that said bi-directional virtual circuit is operational based on the reception of said plurality of said response packets; and

concluding that said bi-directional virtual circuit is operational according to the determination of said another end system.

Claim 26 (Original): The computer readable medium of claim 25, wherein said concluding comprises:

examining a receive frequency at which said plurality of loopback command packets are received; and

determining that said bi-directional virtual circuit is operational if said receive frequency does not change substantially.

Claim 27 (Original): The computer readable medium of claim 26, wherein said bi-directional virtual circuit comprises a permanent virtual circuit provisioned on an asynchronous transfer mode (ATM) backbone, and each of said plurality of loopback command packets and plurality of loopback response packets comprises a cell.

Claim 28 (Original): The computer readable medium of claim 27, wherein said plurality of loopback command packets and said plurality of loopback response packets are generated consistent with ITU-T Recommendation I.610.

Claim 29 (Original): The computer readable medium of claim 26, wherein said first end system continues to conclude that said bi-directional virtual circuit is operational if

said receive frequency does not change substantially and does not send new loopback command packets to said another end system.

Claim 30 (Original): The computer readable medium of claim 29, further comprising:

sending another plurality of loopback command packets at a sending frequency; and

comparing said sending frequency with said receive frequency, wherein said first end system determines not to send new loopback command packets based on said comparing.

Claim 31 (Original): The computer readable medium of claim 30, wherein said first end system determines not to send new loopback command packets if said sending frequency is less than said receiving frequency.

Claim 32 (Original): The computer readable medium of claim 30, wherein said first end system waits a random amount of time before stopping sending new loopback command packet if said sending frequency is at least approximately equal to said receive frequency.

Claim 33 (New) The method of claim 1, wherein said another end system sends said plurality of loopback command packets according to a first pattern if said another end system determines that said bi-directional virtual circuit is operational and according to a second pattern otherwise, wherein said concluding is based on the pattern with which said plurality of loopback command packets are received from said another end system.

Claim 34 (New) The first end system of claim 10, wherein said another end system sends said plurality of loopback command packets according to a first pattern if said another end system determines that said bi-directional virtual circuit is operational and according to a second pattern otherwise, wherein said processor stores said data in said

memory if said plurality of loopback command packets are received from said another end system with said first pattern.

Claim 35 (New) The first end system of claim 21, wherein said another end system sends said plurality of loopback command packets according to a first pattern if said another end system determines that said bi-directional virtual circuit is operational and according to a second pattern otherwise, wherein said means for concluding concludes based on the pattern with which said plurality of loopback command packets are received from said another end system.

Claim 36 (New) The computer readable medium of claim 25, wherein said another end system sends said plurality of loopback command packets according to a first pattern if said another end system determines that said bi-directional virtual circuit is operational and according to a second pattern otherwise, wherein said concluding is based on the pattern with which said plurality of loopbackcommandpackets are received from said another end system.